

## **EGM 96-003: STEAM GENERATOR TUBE INSPECTIONS**

**(Updated June 1, 2000)**

◦ **NOTE:** This guidance was originally issued on September 26, 1996. It has been updated to reflect recent Enforcement Policy revisions and current enforcement practices.

This guidance should be used to address violations that, for whatever reason, are not addressed within the reactor oversight process and the significance determination process.

This memorandum is being issued to provide enforcement guidance for evaluating enforcement issues that may be raised during the review of licensee steam generator (SG) inspections in the areas of steam generator tube surveillance, maintenance, and related program issues. The enclosed guidance regarding the severity level classification primarily focuses on applying Appendix B criteria to SG findings, but does note that 10 CFR 50.65 (the Maintenance Rule) is applicable. The guidance has been developed in close coordination with the Division of Engineering, NRR.

Attachment 1 contains guidance in a format similar to the Supplements to the Enforcement Policy for assessing the potential severity level of noncompliances. Concerns relating to specific circumstances should be evaluated against cases contained in Attachment 2.

The guidelines in the attachments are intended to provide guidance to the NRC staff to facilitate consistent categorization of severity levels associated with SG tube problems. It is important to note that these guidelines are not currently contained in the Enforcement Policy and are, therefore, not controlling. They should be used to assist in applying the definition in Section IV of the Policy: (1) instances of very significant regulatory concerns (for Severity Level II violations), (2) significant regulatory concerns (for Severity Level III violations), or (3) more than of minor concern (for Severity Level IV violations).

The severity level guidance paragraphs in Attachment 1 use the phrase "not being able to fulfill the intended safety function," which is consistent with the Supplements to NUREG-1600. The steam generators have two different types of safety function: to provide an intact RCS boundary and prevent significant offsite releases, and to provide a means for decay heat removal. A gross failure in one SG might prevent the first safety function from being fulfilled even if the other SG(s) remained intact. However, leaks in one or more SGs might still allow the second safety function to be fulfilled by the remaining intact SG(s). Either SG safety function can be considered in determining the severity level of a violation. If both safety functions are impacted, consideration should be given to a higher severity level based on risk considerations.

To maintain consistency of enforcement in this area, all cases of violation associated with steam generator tube problems should be paneled in the weekly regional calls. The Branch Chief for Materials and Chemical Engineering Branch, Division of Engineering, NRR, is to be invited to attend the panels to provide the NRC technical perspective. Based on experience in applying this guidance, OE intends to consider appropriate changes to the guidance and changes to the Enforcement Policy after consultation with the Commission.

Attachments: As stated

## **ATTACHMENT 1: STEAM GENERATOR TUBE INSPECTION VIOLATIONS**

The steam generators have two different types of safety function: to provide an intact RCS boundary and prevent significant offsite releases, and to provide a means for decay heat removal. A gross failure in one SG might prevent the first safety function from being fulfilled even if the other SG(s) remained intact. However, leaks in one or more SGs might still allow the second safety function to be fulfilled by the remaining intact SG(s). Either SG safety function can be considered in determining the severity level of a violation. If both safety functions are impacted, consideration should be given to a higher severity level based on risk considerations.

A. Severity Level I - Violations involving for example:

The steam generators (SGs), which are designed to support the prevention or mitigation of a serious safety event, not being able to perform the intended safety function when actually called upon to work, such as due to tube ruptures or gross structural failure, caused by licensee performance deficiencies such as inadequate assessment of or corrective actions for SG tube flaws.

B. Severity Level II - Violations involving for example:

The SGs, which are designed to support the prevention or mitigation of a serious safety event, not being able to perform the intended safety function, such as due to loss of structural integrity, caused by licensee performance deficiencies such as inadequate assessment of or corrective actions for SG tube flaws.

C. Severity Level III - Violations involving for example:

1. One SG not being able to perform its intended plant cooling safety function, such as due to loss of structural integrity.

2. The SGs are determined to be degraded to such an extent that the SGs would not have been able to perform the intended safety function under certain conditions.

D. Severity Level IV (SLIV)- Violations involving for example:

Violations in procedure adequacy, procedure adherence, or flaw dispositioning that are of more than minor concern, but which do not amount to a Severity Level I, II, or III violation.

E. Minor Violations - Violations involving for example:

Isolated procedure errors or mistakes in dispositioning of SG tube flaws with otherwise good licensee programs and good corrective actions, which did not result in exceeding TS limits and if such error or mistakes recurred, they would still be considered minor.

## ATTACHMENT 2: EXAMPLE CASES

### Case #1

During an outage, a licensee determined that an unexpectedly large number of SG tubes require plugging due to flaw indications that indicated that the tubes were defective (flaws concluded to be greater than the 40% through wall TS limit for returning to service). The inspector reviewed the licensee's actions, which included a re-examination of the previous outage data for the locations that now exceeded TS allowable. All previous determinations for those locations had been that there was "no detectable degradation." The re-examination concluded that one location had not been properly dispositioned during the previous outage and that the affected tube should have been plugged. The affected tube did not fail during the subsequent cycle. The inspector concluded that an inadvertent personnel error had occurred, but that the licensee's corrective actions were good.

#### Conclusion:

- Inadvertent personnel error - no willfulness
- One example of failure to follow procedures (Appendix B, Criterion V)
- No significant consequences or programmatic concerns
- No basis for escalated enforcement
- Potential SLIV violation, or
- Potential minor violation

### Case #2

During an outage, a licensee determined that an unexpectedly large number of SG tubes require plugging due to flaw indications that indicated that the tubes were defective. The inspector reviewed the licensee's actions, which included a re-examination of the previous outage data for the spots that now exceeded TS allowable. All previous determinations for those locations had been that there was "no detectable degradation." The re-examination concluded that many locations had not been properly dispositioned during the previous outage and that the affected tubes should have been plugged.

#### Conclusion:

- Many examples of failure to follow procedure (Appendix B, Criterion V)
- Severity Level IV violation with multiple examples if each discrepancy was an example of a similar error; Multiple Severity Level IV violations if the errors were of a different nature for different tubes.
- Potential Severity Level III violation if the magnitude of the errors amounted to a loss of structural integrity or function (See attachment 1, item C.1 and C.2.)

#### Note:

- If all SGs were found to be degraded such that structural integrity could not be demonstrated, then see NUREG-1600, Supplement I.B.1. This case is represented as Attachment 1, item B.
- If structural integrity for one SG was lost, then see NUREG-1600, Supplement I.C.2. This case is represented in Attachment 1, item C.1.
- If the structural integrity was not lost but was significantly degraded in more than one SG (and included both safety trains), a SLIII may still be merited, especially if a worst case transient might have resulted in SG tube rupture(s). This case is represented as Attachment 1, item C.2.

### Case #3

During an outage, a licensee applied a technology or method not previously used at the facility. A large number of defects were identified compared with inspections during previous outages. The licensee re-examined the old data and no significant dispositioning problems were identified. NRC conducted an independent review of a sample of the previous determinations.

Scenario #1 - NRC identifies no discrepancies

- Probable conclusion is that new method simply found "more"
- No violation

Scenario #2 - NRC concludes small number should have been "defect"

- similar to **Case #1**

Scenario #3 - NRC concludes substantial number **should** have been "defect"

- similar to **Case #2**

### Case #4

Licensee left in service tubes with defects. Licensee asserted that the defects were within the TS limits. The NRC position was that the licensee was not correct. The licensee noted that there was no proof or even evidence that the tubes had been beyond TS limits. Specifically, the licensee plugged many tubes in a current outage and many of the tubes had been left in service two outages ago with defects that were concluded not to exceed TS limits (i.e., not greater than the 40% through wall TS limit). The tubes were not reinspected during the next outage and during the current outage were found well beyond the TS limit (e.g., 80%). The NRC position: it was a virtual certainty that most, if not all, the tubes affected were beyond the TS limit during the previous outage (but were not inspected) and were therefore left in service in violation of the TS.

Conclusion:

- A violation occurred, based on the preponderance of the evidence
- Each affected tube could represent a SLIV
- See Zion case, EA 95-118, NUREG-0940, Volume 14, Nos 3 and 4

### Case #5

A facility licensee was determined to be performing little monitoring for SG tube leakage. The unit TS contained a limit of 150 gpd for SG leakage and the licensee monitoring measures were adequate to detect that the TS limit was met. NRC and industry notifications had occurred concerning SG tube leakage that showed that leaks above 50 gpd could rapidly grow to gross failure. The current technology in use at other sites could detect leakage as low as 20 gpd. The licensee had taken no additional actions after the notifications. Actual SG leakage was confirmed to be below 150 gpd. No TS violation occurred.

Conclusion - under Appendix B:

- Possible violation of requirement to review events or notifications
- The requirement comes from NUREG-0737 (imposed by Order), I.C.5, as used in EA 91-182 (NUREG-0940, Vol 11, No. 1, page I.A-1)

## Case #6

During operation, a facility experienced a major SG tube rupture event. The licensee stabilized the plant and went to cold shutdown to effect repairs. NRC inspection of the event also looked into the cause of the SG tube rupture, including review of the SG tube assessment practices and data from the previous outages.

Conclusion - if no assessment problem found (e.g., unexpected loose part):

- No violation

Conclusion - if assessment deficiencies determined to be root cause:

- Potential Severity Level I violation, especially if substantial offsite releases occurred (though such releases are not a prerequisite)
- Potential Severity Level III or II violation, if extent of event is considered not to merit a Severity Level I violation.